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HOFFMAN WARNICK LLC  
75 STATE ST  
14TH FL  
ALBANY, NY 12207

EXAMINER
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GOODCHILD, WILLIAM J

ART UNIT	PAPER NUMBER
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2445

NOTIFICATION DATE	DELIVERY MODE
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10/29/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

efiplaw@us.ibm.com  
PTOCcommunications@hoffmanwarnick.com



## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Elzur, (US Publication No. 2004/0034725), and further in view of Shah et al., (US Patent No. 6,460,080), (hereinafter Shah).

Regarding claims 1, 9 and 16, Elzur discloses placing each out-of-order [Elzur, paragraph 9] RDMA message [Elzur, paragraph 9, line 1] to a reassembly buffer [Elzur, paragraph 9, lines 8-9, 'or alternatively requires buffering till the TCP hole is plugged' and paragraph 6, see also, paragraph 49], wherein each in-order RDMA message bypasses the reassembly buffer [Elzur, paragraph 9 and paragraph 6, lines 6-8] and is sent to an internal data buffer [Elzur, paragraph 6, lines 11-12, 'It may also remove the need for data buffering on the NIC', meaning that there can be data buffering on the NIC] for direct placement to a destination buffer [Elzur, paragraph 6, lines 6-8]; storing information regarding each out-of-order [Elzur, paragraph 9, line 7] RDMA message [Elzur, paragraph 6, lines 6-8] on a per TCP hole basis [Elzur, paragraph 9,

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line 5], wherein a TCP hole is a vacancy created in a TCP stream as a result of an out-of-order TCP segment [Elzur, paragraph 9, lines 1-9], in a connection context on a per TCP hole basis [Elzur, paragraph 9, lines 1-9];

delivering the plurality of RDMA messages in-order [Elzur, paragraph 6, lines 6-11], such that the out-of-order RDMA messages are reassembled in-order in the reassembly buffer [Elzur, paragraph 9, buffering till the TCP hole is plugged].

Elzur does not specifically disclose wherein the information stored for RDMA Read messages includes at least a number of pending RDMA Read Request messages waiting for a doorbell ring or a number of completed RDMA Read Response messages]. However, Shah, in the same field of endeavor discloses send and receive requests with descriptors in a work queue and ringing a doorbell to notify the NIC that work has been placed in the work queue [Shah, column 5, lines 1-6].

It would have been obvious to one having ordinary skill in the art at the time the invention was made to include read requests and read response messages waiting for a doorbell ring in order to inform the NIC that work is waiting.

Regarding claims 2, 10 and 17, Elzur-Shah further discloses ringing the doorbell of a network interface controller (NIC) [Shah, column 5, lines 1-8] that each of the number of pending RDMA [Elzur, paragraph 6] read response messages [Shah, column 5, lines 1-8] have been posted to a respective work queue element (WQE) of a read queue [Shah, column 5, lines 1-15] upon closing of a respective TCP hole [Elzur, paragraph 9].

Regarding claim 3, Elzur-Shah further discloses processing each WQE [Shah, column 5, lines 1-15].

Regarding claims 4, 11 and 18, Elzur-Shah further discloses for RDMA Send type messages, the delivery step includes, for each RDMA Send message of a TCP hole [Elzur, paragraphs, 6 and 9], placing RDMA Send message specific information to a work queue element (WQE) associated with the respective RDMA Send message [Shah, column 5, lines 1-15].

Regarding claims 5, 12 and 19, Elzur-Shah further discloses placing a completion queue element (CQE) to a completion queue (CQ) upon closing of the TCP hole [Shah, column 5, line 11].

Regarding claims 6, 13 and 20, Elzur-Shah further discloses wherein a number of CQEs is equal to a number of RDMA Send messages [Shah, column 5, lines 1-15] of the TCP hole [Elzur, paragraph 9].

Regarding claims 7, 14 and 21, Elzur-Shah further discloses wherein RDMA Send message specific information is retrieved from a respective WQE upon a Poll-for-Completion request by an RDMA verb interface [Shah, column 5, lines 8-15].

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Regarding claims 8, 15 and 22, Elzur-Shah further discloses reporting completion of RDMA Read work requests [Shah, column 5, lines 8-11] upon closing of the TCP hole [Elzur, paragraph 9].

### ***Response to Arguments***

3. Applicant's arguments filed 06/19/2009 have been fully considered but they are not persuasive.

A - Applicant argues "the combination of Elzur and Shah does not teach or suggest a method for delivering a plurality of RDMA messages including, inter alia, 'placing each out-of-order RDMA message to a reassembly buffer, wherein each in-order RDMA message bypasses the reassembly buffer and is sent to an internal data buffer for direct placement to a destination buffer'. There is no disclosure of differentiating between an in-order and an out-of-order message to determine which buffer to send the message to".

A – Elzur discloses an in-order buffer and an out-of-order buffer [Elzur, paragraphs 6 and 9, Elzur discusses that the incoming packet may be placed in a final destination memory address (the internal data buffer). Elzur also discusses that an out-of-order packet can require buffering till the TCP hole is plugged, paragraph 6, lines 11-12, it may also remove the need for data buffering on the NIC, see paragraph 49, the NIC may buffer out-of-order data until the TCP hole is plugged, prior to forwarding on).

B – Applicant argues “The Office further posits that Elzur teaches ‘storing information regarding each out-of-order RDMA message ... in a connection context on a per TCP hole basis’ ... Applicants respectfully submit, however, that Elzur fails to teach or suggest such a connection context”.

B – Elzur discloses a TCP hole [Elzur, at least in paragraphs 6 and 9]. Shah discloses a doorbell ring in a connection context [Shah, at least, column 5, lines 1-5, a connection is established, send and received requests are processed and then a doorbell is rung].

### ***Conclusion***

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Examiner's Note: Examiner has cited particular paragraphs / columns and line numbers in the reference(s) applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the cited passages as taught by the prior art or relied upon by the examiner.

Should applicant amend the claims of the claimed invention, it is respectfully requested that applicant clearly indicate the portion(s) of applicant's specification that support the amended claim language for ascertaining the metes and bounds of applicant's claimed invention

Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM J. GOODCHILD whose telephone number is (571)270-1589. The examiner can normally be reached on Monday - Friday / 8:00 AM - 4:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vivek Srivastava can be reached on (571) 272-7304. The fax phone



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number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

WJG  
10/13/2009

/VIVEK SRIVASTAVA/  
Supervisory Patent Examiner, Art Unit 2445